rpoS in the GacS mutant were reduced in each of these growth phases compared to the wild type expression. The down stream sequence from *rpoS* lacked sequences encoding a small RNA, *rsmZ*, found in other pseudomonads and implicated in control of genes activated by the GacS system. These findings suggest that GacS-mediated regulation of RpoS plays role in control of oxidative stress in *P. chlororaphis* O6 by as yet an unknown mechanism.

2-30. Isolation and characterization of induced disease resistance (ISR)-deficient mutants of a biocontrol bacterium *Pseudomonas chlororaphis* O6.

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Lipopolysaccharide, siderophore, and cyclic dipeptide have been shown to be necessary for ISR induction by pseudomnads. However, there is no report on cloning of genes or generating specific mutants involving in ISR activity. A biological control bacteium *P. chlororaphis* O6 induces resistance to *Erwinia carotovora* subsp. carotovara SCC1 in tobacco and induces drought resistance in *Arabidopsis*. To isolate genes involved in ISR activity and induction of drough resistance of O6, we constructed Tn5 mutants and were used to screen for ISR activity and drought resistance activity using microtiter assay with tobacco and *Arabidopsis*. Thirty-three ISR-deficient mutants were selected, and the nine ISR-deficient mutants were also lost activity of drought resistance. The flanking sequence analysis of the ISR and drought resistance-deficient mutants showed that a *gacS* gene encoding a two-component sensor kinase, and a *mce* gene encoding a protein involved in mycobacterial cell entry were mutated. The flanking sequence of each Tn5 mutant altered ISR activity is currently under investigation. These results indicate that *gacS* and *mce* are important genes in induction of ISR activity and drought resistance of *P. chlororaphis* O6. Our works will open opportunities for identification of bacterial genes or traits that are involved in ISR activity and induced drought resistance of *P. chlororaphis* O6.

2-31. Bacterial determinants involved in the induction of systemic resistance and plant growth promotion in tobacco by *Pseudomonas chlororaphis* O6.

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The ability of *P. chlororaphis* O6 to induce resistance to *Erwinia carotovora* subsp. carotovara SCC1 and to promote growth in tobacco was demonstrated in microtiter assays on plants pre-inoculated at the root level with the bacteria before challenge with the leaf pathogen. To identify th bacterial determinants involved in induced systemic resistance and plant growth promotion, cell culture of O6 grown in King's medium B was fractionated with organic solvents and purified using various columns. *In vivo* and *in vitro* assays with samples from successive fractionation steps of the O6 supernatant led to the conclusion that antibacterial compounds were

observed in aqueous layer, and to the isolation of fractions containing metabolites that retained most of the resistance-inducing activity (70:30, methanol:water) and the plant growth promotion (80:20 and 90:10, methanol:water) after ODS column chromatography. Although these molecules remain to be purified further and structurally characterized, its isolation is an addition to the range of determinants from plant growth-promoting rhizobacteria known to stimulate plant defence.

2-32. Identification of an antagonistic bacteria and its antibiotic substance against *Colletotrichum orbiculare* causing anthracnose on cucumber

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A bacterial strain YC4963 with antifungal activity against *Colletotrichum orbiculare*, a causal organism of cucumber anthracnose was isolated from the rhizosphere soil of Siegesbeckia pubescens (*Siegesbeckia pubescens* Makino; Family: Compositae) in Korea. Based on physiological and biochemical characteristics and 16S ribosomal DNA sequence analysis, the bacterial strain was identified as *Pseudomonas aureofaciens*. The bacteria also inhibited mycelial growth of several plant fungal pathogens such as *Botrytis cinerea, Fusarium oxysporum* and *Rhizoctonia solani* on PDA and 0.1 TSA media. The antibiotic activity was found from the culture filtrate of TSB(tryptic soy broth) and its active compounds were quantitatively bound to XAD adsorber resin. The antibiotic spectrum was broad and growth of *C. orbiculare* and *F. oxysporum*, *B. cinerea* were inhibited at very low concentration. The chemical data from various chromatographic procedures showed that active fraction consisted of at least two phenazine derivatives. However, the metabolites had no inhibitory effect on *Pythium ultimum* which was reported to be sensitive to phenazine antibiotics. The compounds responsible for the activity are now under investigation.

2-33. Biological control of Lettuce Sclerotinia rot using *Bacillus mojanvinensis* Pro-EB 15 strain.

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This studies were investigated the occurrence of Sclerotinia rot by *Sclerotinia Sclerotiorum* at the lettuce field in Uiryeong-Gun, Gyeongsangnam-Do and were isolated the most effective microorganism for the biological control to the pathogen, *S. sclerotiorum* YR-1 strain from diseased soil and lettuce leaves. For the pathogenicity test, the most suitable inoculmn density of YR-1 strain was selected as the mycelial suspension of 40ml showing disease incidence of 80%, and the symptom showed as same as at the fields, the leaves and stem had rotten and developed white downy mycelial at the diseased lesion on the leaves and stems, and produced black and irregular sclerotinia. On the PDA dual test, about 300 isolates were examined the antifungal activity to the pathogen, YR-1 strain, and among them, A-2, A-7, and RH-4 strain were selected most effective